SEQUENCE LISTING

<110> Murphy, Brian R.
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Skiadopoulos, Mario H.
Tao, Tao

<120> USE OF RECOMBINANT PARAINFLUENZA VIRUSES (PIVs) AS
VECTORS TO PROTECT AGAINST INFECTION AND DISEASE CAUSED
BY PIV AND OTHER HUMAN PATHOGENS

<130> 15280-404100US

<140> 90/733,692
<141> 2000-12-08

<150> 60/170,195
<151> 1999-12-10

<160> 62

<170> PatentIn Ver. 2.1

<210> 1
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Sequence of
pFLC.PIV32CT, 15474 bp in sense orientation.

<400> 1
cttaagaata tacaaataag aaaaacttag gattaaagag cg   42

<210> 2
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
sequence of Measles HA gene insert for N-P and P-M
junctions

1

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<400> 2
gatccaacaa agaaacgaca ccgaacaaac cttaag                              36


<210> 3
<211> 101
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of Measles HA gene insert for HN-L
      junction

<400> 3
aggcctaaaa gggaaatata aaaaacttag gagtaaagtt acgcaatcca actctactca 60
tataattgag gaaggaccca atagacaaat ccaaattcga g                      101


<210> 4
<211> 79
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of Measles HA gene insert for HN-L
      junction

<400> 4
tcataattaa ccataatatg catcaatcta tctataatac aagtatatga taagtaatca 60
gcaatcagac aataggcct                                               79


<210> 5
<211> 64
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site
      for GU insertion

<400> 5
aggaaaaggg aaatataaaa aacttaggag taaagttacg cgtgttaact tcgaagagct 60
ccct                                                               64
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<210> 6
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site
      for NCR insertion

<400> 6
aggaaaaggg aacgcgtgtt aacttcgaag agctccct   38

<210> 7
<211> 63
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site
      for supernumerary gene insert between the P and M
      genes of rHPIV3

<400> 7
ttaacaatat acaaataaga aaaacttagg attaaagagc catggcgtac gaagcttacg 60
cgt   63

<210> 8
<211> 12
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PIV3 gene end
      (GE) sequence

<400> 8
aagtaagaaa aa   12

<210> 9
<211> 58
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site

3

for RSV G and F gene inserts in B/H PIV3

<400> 9
aggattaaag aactttaccg aaaggtaagg ggaaagaaat cctaagagct tagcgatg   58

<210> 10
<211> 11
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
       sequence for RSV G gene insert in B/H PIV3

<400> 10
gcttagcgat g   11

<210> 11
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
       sequence of RSV G and F gene inserts in B/H PIV3

<400> 11
aagctagcgc ttagc   15

<210> 12
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
       sequence for RSV F gene insert in B/H PIV3

<400> 12
gcttagcaaa aagctagcac aatg   24

<210> 13
<211> 83
<212> DNA

4

<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
     for PCR of measles HA gene insert for N-P and P-M
     junctions

<400> 13
ttaatcttaa gaatatacaa ataagaaaaa cttaggatta aagagcgatg tcaccacaac 60
gagaccggat aaatgccttc tac   83

<210> 14
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
     for PCR of measles HA gene insert for N-P and P-M
     junctions

<400> 14
attattgctt aaggtttgtt cggtgtcgtt tctttgttgg atcctatctg cgattggttc 60
catcttc   67

<210> 15
<211> 55
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
     for PCR of measles HA gene insert for HN-L
     junction

<400> 15
gacaataggc ctaaaaggga aatataaaaa acttaggagt aaagttacgc aatcc   55

<210> 16
<211> 68
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:

5

Reverse/Forward primer for PCR of measles HA gene
insert for HN-L junction

<400> 16
gtagaacgcg tttatccggt ctcgttgtgg tgacatctcg aatttggatt tgtctattgg 60
gtccttcc   68

<210> 17
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
     for PCR of measles HA gene insert for HN-L
     junction

<400> 17
ccatgtaatt gaatccccca acactagc   28

<210> 18
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
     Forward/Reverse primer for PCR of measles HA gene
     insert for HN-L junction

<400> 18
cggataaacg cgttctacaa agataacc   28

<210> 19
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Upstream HPIV2
     HN primer

<400> 19
gggccatgga agattacagc aat   23

<210> 20
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Downstream
     HPIV2 HN primer

<400> 20
caataagctt aaagcattag ttccc   25

<210> 21
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Upstream HPIV2
     HN primer

<400> 21
gcgatgggcc cgaggaagga cccaatagac a   31

<210> 22
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Downstream
     HPIV2 HN primer

<400> 22
cccgggtcct gatttcccga gcacgctttg   30

<210> 23
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: HPIV1 HN
     primer

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<400> 23
agtggctaat tgcattgcat ccacat                                          26


<210> 24
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: HPIV1 HN
      primer

<400> 24
gccgtctgca tggtgaatag caat                                            24


<210> 25
<211> 13
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 25
cgcggcaggc ctg                                                        13


<210> 26
<211> 14
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 26
cgcggcgagg cctg                                                       14


<210> 27
<211> 15
<212> DNA
<213> Artificial Sequence
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<220>
<223> Description of Artificial Sequence: Oligomer
     insert for rule-of-six conformity

<400> 27
cgcgaggcct ccgcg   15

<210> 28
<211> 16
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
     insert for rule-of-six conformity

<400> 28
cgcgccgcgg aggcct   16

<210> 29
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
     insert for rule-of-six conformity

<400> 29
cgcgcccgcg gaggcct   17

<210> 30
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
     for RSV A G gene insert

<400> 30
aattcgctta gcgatgtcca aaaacaagga ccaacgcacc gc   42

9

<210> 31
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for RSV A G gene insert

<400> 31
aaaaagctaa gcgctagcct ttaatcctaa gttttttctta cttttttttac tactggcgtg 60
gtgtgttggg tggagatgaa ggttgtgatg gg   92

<210> 32
<211> 65
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for RSV A F gene insert

<400> 32
aaaggcctgc ttagcaaaaa gctagcacaa tggagttgct aatcctcaaa gcaaatgcaa 60
ttacc   65

<210> 33
<211> 89
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for RSV A G gene insert

<400> 33
aaaagctaag cgctagcttc tttaatccta agttttttctt acttttatta gttactaaat 60
gcaatattat ttataccact cagttgatc   89

<210> 34
<211> 44
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Mutagenic
      forward primer for modification of rHPIV3-1 cDNA

<400> 34
cggccgtgac gcgtctccgc accggtgtat taagccgaag caaa   44

<210> 35
<211> 59
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Mutagenic
      reverse primer for modification of rHPIV3-1 cDNA

<400> 35
cccgagcacg ctttgctcct aagtttttta tatttcccgt acgtctattg tctgattgc   59

<210> 36
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for insertion of HPIV2 F ORF into rB/HPIV3 genome

<400> 36
aaaatatagc ggccgcaagt aagaaaaact taggattaaa ggcggatgga tcacctgcat 60
ccaatgatag tatgcatttt tgttatgtac actgg   95

<210> 37
<211> 72
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for insertion of HPIV2 F ORF into rB/HPIV3 genome

<400> 37
aaaatatagc ggccgctttt actaagatat cccatatatg tttccatgat tgttcttgga 60
aaagacggca gg   72

11

<210> 38
<211> 81
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
     for insertion of HPIV2 HN ORF into rB/HPIV3 genome

<400> 38
ggaaaggcgc gccaaagtaa gaaaaactta ggattaaagg cggatggaag attacagcaa 60
tctatctctt aaatcaattc c   81

<210> 39
<211> 54
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
     for insertion of HPIV2 HN ORF into rB/HPIV3 genome

<400> 39
ggaaaggcgc gccaaaatta aagcattagt tcccttaaaa atggtattat ttgg   54

<210> 40
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV2 F
     (sense)

<400> 40
gtaccatgga tcacctgcat ccaat   25

<210> 41
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for

12

construction of PIV3-2 chimeric cDNAs, PIV2 F
(antisense)

<400> 41
tgtggatcct aagatatccc atatatgttt c   31

<210> 42
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 F
      (sense)

<400> 42
atgcatcacc tgcatccaat   20

<210> 43
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2
      (antisense)

<400> 43
tagtgaataa agtgtcttgg ct   22

<210> 44
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (sense)

<400> 44
catgagataa ttcatcttga tgtt   24

13

```
<210> 45
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (antisense)

<400> 45
agcttaaagc attagttccc ttaa                                    24


<210> 46
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 F
      (sense)

<400> 46
atcataatta ttttgataat gatcatta                                28


<210> 47
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 F
      (antisense)

<400> 47
gttcagtgct tgttgtgtt                                          19


<210> 48
<211> 27
<212> DNA
<213> Artificial Sequence
```

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<220>
<223> Description of Artificial Sequence: Primer for
       construction of PIV3-2 chimeric cDNAs, PIV3 HN
       (sense/antisense)

<400> 48
tcataattaa ccataatatg catcaat   27

<210> 49
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
       construction of PIV3-2 chimeric cDNAs, PIV3 HN
       (sense)

<400> 49
gatggaatta attagcacta tgat   24

<210> 50
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
       construction of PIV3-2 chimeric cDNAs, PIV2 F
       (antisense)

<400> 50
atgcatcacc tgcatccaat   20

<210> 51
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
       construction of PIV3-2 chimeric cDNAs, PIV2 F
       (sense)

<400> 51

gatgatgtag gcaatcagc   19

<210> 52
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV2 HN
     (sense)

<400> 52
actgccacaa ttcttggc   18

<210> 53
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV2 HN
     (antisense)

<400> 53
ttaaagcatt agttccctta aaaatg   26

<210> 54
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV3 F
     (sense)

<400> 54
aagtattaca gaattcaaaa gag   23

<210> 55
<211> 20
<212> DNA

16

<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 HN
      (antisense)

<400> 55
cttattagtg agcttgttgc   20

<210> 56
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 F
      (sense)

<400> 56
accgcagctg tagcaatagt   20

<210> 57
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (antisense)

<400> 57
gattccatca cttaggtaaa t   21

<210> 58
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 M
      (sense)

17

<400> 58
gatactatcc taatattatt gc   22

<210> 59
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 L
      (antisense)

<400> 59
gctaattttg atagcacatt   20

<210> 60
<211> 15492
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Sequence of
      pFLC.PIV32, 15492 bp in sense orientation

<400> 60
accaaacaag agaagaaact tgtctgggaa tataaattta actttaaatt aacttaggat 60
taaagacatt gactagaagg tcaagaaaag ggaactctat aatttcaaaa atgttgagcc 120
tatttgatac atttaatgca cgtaggcaag aaaacataac aaaatcagcc ggtggagcta 180
tcattcctgg acagaaaaat actgtctcta tattcgccct tggaccgaca ataactgatg 240
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aacatgcaca aagggcaggg ttcttggtgt ctttattgtc aatggcttat gccaatccag 360
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agaaagatct aaaacggcaa aagtatggag gatttgtggt taagacgaga gagatgatat 480
atgaaaagac aactgattgg atatttggaa gtgacctgga ttatgatcag gaaactatgt 540
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catgtttagg agctcttata atacagatct ggatagttct ggtcaaagct atcactagta 660
tctcagggtt aagaaaaggc tttttcaccc gattggaagc tttcagacaa gatggaacag 720
tgcaggcagg gctggtattg agcggtgaca cagtggatca gattgggtca atcatgcggt 780
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18

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agacatcttt ccacaaaccg acaggtggat cagccataga gatggcaata gatgaagagc 1380
cagaacaatt cgaacataga gcagatcaag aacaaaatgg agaacctcaa tcatccataa 1440
ttcaatatgc ctgggcagaa ggaaatagaa gcgatgatca gactgagcaa gctacagaat 1500
ctgacaatat caagaccgaa caacaaaaca tcagagacag actaaacaag agactcaacg 1560
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19

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26

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29

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31

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32

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33

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34

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